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U.S. COAST GUARD SAFE POWERING STANDARD TEST PROCEDURE. (U)

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USCG-B-001-80

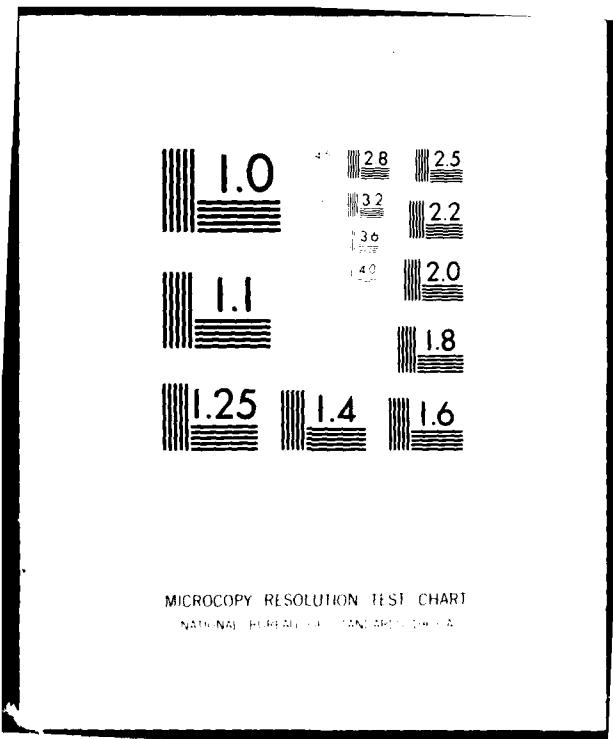
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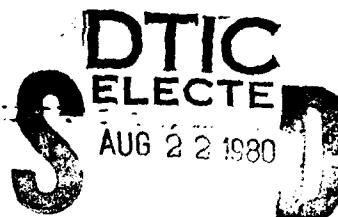
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SAFE PUMPING STANDARD TEST PROCEDURE

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U. S. Coast Guard Office of Boating, Public and Consumer Affairs
Boating Technical Division
2100 Second Street SW
Washington, D. C. 20593



June 1980

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Final Report

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PREPARED FOR
U.S. DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD
WASHINGTON, D.C. 20593

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16. Abstract This report describes in detail a Safe Powering Standard Test Procedure for outboard powered boats. The Safe Powering Standard Test Procedure is designed to determine whether or not a given boat meets the safe powering requirements outlined in the Federal Boat Safety Act of 1971 (P. L. 92-75) and the rules and regulations in the Federal Register: 37 FR 15782, Aug. 4, 1972.			
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Metric Conversion Factors

Appendix: Conversion to Metric Measures

Approximate Conversions from Metric Measures

Symbol	When You Know	Method by To Find	Length
ρ	Cubus Response and ρ	<u>Volume</u>	<u>Mass (weight)</u>
ρ	Cubus Response and ρ	<u>Mass (weight)</u>	<u>Area</u>
ρ	Cubus Response and ρ	<u>Area</u>	<u>Length</u>
ρ	Cubus Response and ρ	<u>Length</u>	

1.0 SCOPE

1.1 Applicability of Federal Boat Safety Act

The boating safety regulations apply to boats and associated equipment which fall within the scope of the Federal Boat Safety Act of 1971. Boats include any vessel:

- a. Manufactured or used primarily for non-commercial use, or
- b. Leased, rented, or chartered to another for the latter's non-commercial use, or
- c. Engaged in the carrying of six or fewer passengers.

1.2 Exceptions

The Federal Boat Safety Act of 1971 applies to all boats used on waters subjected to the jurisdiction of the United States and on the high seas beyond the territorial seas for vessels owned in the United States except:

- a. Foreign vessels temporarily using waters subject to United States jurisdiction.
- b. Military or non-recreational public vessels of the United States.
- c. Ships' lifeboats.
- d. A vessel whose owner is a state or subdivision thereof, which is used principally for governmental purposes and which is clearly identifiable as such.

1.3 Applicability of Safe Powering Standard

The Safe Powering Standard and amendment thereto (Appendix A) applies to all conventional general purpose outboard boats less than 20 feet in length, the hull of which is begun after 31 October 1972, except sailboats, inflatables, canoes and kayaks. For the purposes of this part of the term "conventional general purpose outboard boats" includes mono-hull displacement or planing boats designed or intended to use one or more outboard motors as a means of propulsion. The term "outboard boat" shall hereafter refer to a "conventional, general purpose, outboard boat" as described above.

1.4 Requirements

The requirements included herein for safe powering of boats specify the maximum allowable horsepower (often called horse-power capacity) in conformance within the jurisdiction of the Federal Boat Safety Act of 1971.

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2.0 PURPOSE

2.1 The USCG Safe Powering Standard establishes the maximum allowable horsepower capacities for outboard boats, establishes how these capacities are to be determined and prescribes how the information is to be displayed. The purpose of this test procedure is to specify the methods and equipment to be employed in determining conformance of applicable boats to the Performance Standard requirements.

3.0 GLOSSARY

Aft - At, near, or toward the stern.

Amidships - The center of the boat, with reference to length.

Beam - The beam is the transverse distance between the outer sides of the boat excluding handles, and other similar fittings, attachments, and extensions.

Bow - The forward part of the boat.

Flat Bottom, Hard Chine Boat - is one whose chine radius is less than one-half inch, whose deadrise measured at the midships station is less than 2.5 degrees, and whose bottom does not contain compound curvature.

Full Transom - A transom with a maximum width which exceeds one-half the maximum beam of the boat.

Horizontal Boat - A boat is horizontal when it is transversely level and when the lowest points at the 40% and 75% of the boat's length behind the most forward point of the boat are level.

Hull - The main body of a boat.

Keel - The backbone of a boat from which rise the frames, stem, etc.; or, in the absence of a structural backbone, the lowest part of the hull along the centerline.

Length - The straight line horizontal measurement of the overall length from the foremost part of the horizontal boat to the aftermost part of the boat, measured from end to end over the deck excluding sheer, and measured parallel to the centerline.

Maximum Allowable Horsepower - The Maximum Allowable Horsepower is the maximum horsepower capacity (as determined by the procedure herein) which is allowed by the Safe Powering Standard.

Monohull Boat - A boat on which the line of intersection of the water surface and the boat at any operating draft forms a single closed curve (catamarans, trimarans and pontoon boats are not monohull boats).

Quarter - The after portion of the sides of a vessel, particularly the furthermost aft portion where the sides meet the transom.

Remote Steering Mechanism - Any mechanical assist device which is rigidly attached to the boat and used in steering the boat including but not limited to mechanical, hydraulic or electrical control systems.

Sheer - The topmost line in a boat's side. The sheer intersects the vertical centerline plane of the boat at the forward end and intersects the transom (stern) at the aft end. For the purposes of this definition, the topmost line in a boat's side is the line defined by a series of points of contact with the boat structure, by straight lines at 45° angles to the horizontal and contained in a vertical plane normal to the outside edge of the boat as seen from above and which are brought into contact with the outside of the horizontal boat (see "Horizontal Boat").

Stem - The foremost upright structural member attached to the keel of the boat.

Stern - The after end of the boat.

Transom - The surface at the stern of a boat projecting or facing aft. The upper boundary of the transom is the line defined by series of points of contact, with the boat structure, by straight lines at 45° angles to the horizontal and contained in a vertical longitudinal plane and which are brought into contact with the stern of the horizontal boat (see "Horizontal Boat").

4.0 TEST PROCEDURE

This procedure includes a description of the test boat, measurement procedures, use of calculations to determine maximum allowable horsepower, and validation of manufacturer's display of capacity information. It also contains a receiving inspection routine common to all types of boats. In this section reference is made to Section 5.0 which describes necessary test records and reports.

4.1 Description of Test Boat and Test Sequence

4.1.1 Test Boat Description - The test boat shall consist of one complete hull as delivered by the manufacturer including all its original and permanent appurtenances and equipment, except that a propulsion system is not required.

4.1.2 Test Sequence - The test boat as described in Paragraph 4.1.1 above shall be subjected to test in the sequence listed below:

Receiving Inspection
Measurements
Horsepower Determination
Validation of Capacity Information

4.2 Test Conditions

4.2.1 Test Article Identification - The test boat shall be identified immediately upon receipt at the test laboratory. This identification shall include marking the vessel with a test article number in a manner which will not allow obliteration of this number during the testing process. The test boat shall be photographed as described below.

- a. An external bow-on view.
- b. An external transom view.
- c. An external side view.
- d. A close-up of the manufacturer's display of capacity markings including a six-inch scale taped along side the plate to illustrate size of plate and lettering.

Each photograph shall include the test article number lettered against a contrasting background. The letters shall be of sufficient size and boldness (two inches minimum for overall views and smaller for close-ups) to be readable from a 5 X 7 inch photograph.

4.2.2 Test Article Storage and Handling

4.2.2.1 Storage Area - A suitable storage area shall be maintained, in accordance with good housekeeping standards, in which the test article will be stored during all non-testing periods.

- 4.2.2.2 Lifting - Lifting slings shall be provided by the test laboratory for use in lifting the boat into suitable fixtures for performing measurements. The lifting slings shall protect the boat from handling damage.

4.2.3 Verification - All operations performed by the laboratory in compliance with this Test Procedure are subject to USCG verification at unscheduled intervals.

4.2.4 Non-Conformance Conditions - The following condition shall be classified as a non-conformance:

Manufacturer's maximum horsepower capacity display exceeds the allowable maximum capacity as determined by this Test Procedure.

Manufacturer installed the alternate capacity plate but has failed to display the maximum horsepower capacity for both type steering mechanisms.

4.2.4.2 Notice of Non-Conformance - A formal Notice of Non-Conformance shall be made to the USCG Contract Monitor within a period of three working days after occurrence. The methods for notification are specified in Paragraph 5.1.1 herein.

4.3 Receiving Inspection

4.3.1 Requirements - A Receiving Inspection shall always be performed prior to any testing. This inspection is designed to check for poor workmanship, shipping damage and conformity with manufacturer's furnished documentation and maintenance manuals. Photographs of any defects or imperfections shall be taken and included in the test report.

4.3.2 Methods

4.3.2.1 Identification - Verify that the boat has been properly identified in accordance with Paragraph 4.2.1. Complete applicable portions of Data Sheet No. 1 - Receiving Inspection.

4.3.2.2 Inventory - Inventory all machinery and other gear and enter with model numbers when available on Data Sheet No. 1. This inventory shall include engines, fuel tanks, controls, navigation equipment, electronic equipment, lifesaving equipment, batteries, fire extinguishers, anchors, etc.

4.3.2.3 Visual Inspection - Visually and manually inspect the boat for structural soundness such as dents, abrasions, loose or missing screws, etc., and functional characteristics. Record all deficiencies on Data Sheet No. 1.

4.3.3 Equipment - No special equipment or instrumentation is required for this inspection except a camera and sufficient lighting to produce photographs which clearly depict the condition of the boat prior to testing.

4.4 Safe Powering Test

4.4.1 Measurements and Preparatory Information

Complete Line 1 of Data Sheet No. 2.

4.4.1.1 Length - The length (L) of the boat is determined by the following procedure:

- a. Locate the extreme forward most point on the centerline of the boat excluding bow sprits, bumpkins, rudders, outboard motor brackets, handles and other such fittings, attachments and extensions. Mark this point as Point "S" (see Figure 1). Rubrails are included in (L).
- b. Locate the extreme aftermost point(s) of the boat excluding bow sprits, bumpkins, rudders, outboard motor brackets, handles and other such fittings, attachments and extensions. Mark this point(s) as Point "T". Rubrails are included in (L).
- c. Referring to Figure 1, place the boat on a boat trailer or chocks on a flat floor and trim the boat until points at 40% and 75% of boat's length are an equal distance from the floor. For this purpose the floor shall be flat to within $\frac{1}{8}$ inch. (Note: Concrete floors are normally flat to this tolerance. Flatness may be verified by use of a surveyor's level and rod placed on a 2-foot grid pattern.)
- d. Similarly trim the boat from side to side until corresponding points at either side of the transom are equal distances from the floor.
- e. Drop a plumb bob from Point "S" to the floor and from Point "T" to the floor and using a tape (0-25 ft in length; with an accuracy of at least $\frac{1}{8}$ inch overall), measure the length (L) parallel to boat's centerline between the projected points as shown in Figure 1. Record the length of the boat on Line 2 of Data Sheet No. 2.

4.4.1.2 Transom Width - Transom width is determined by the following procedure:

- a. Place the boat on a trailer or chocks and trim as in the preceding paragraph.
- b. If the boat has a full transom (see Figure 2), place two vertical stands against the sides of the boat at the points where they join the transom as in Figure 3(a). Using a tape (0-10 ft in length with an overall accuracy of $1/8$ inch), measure the distance (C) between the two stands. Record this distance (C) on Line 3 of Data Sheet No. 2.
- c. If the boat does not have a full transom (see Figure 2), place the two vertical stands at the widest part of the aftermost quarterlength of the boat, as in figure 3(b). Adjust the uprights fore-and-aft so that the distance (C) is maximum and the distances A and A' are equal. Using the tape, measure the distance (C) between the stands, and record on Line 3 of Data Sheet No. 2.

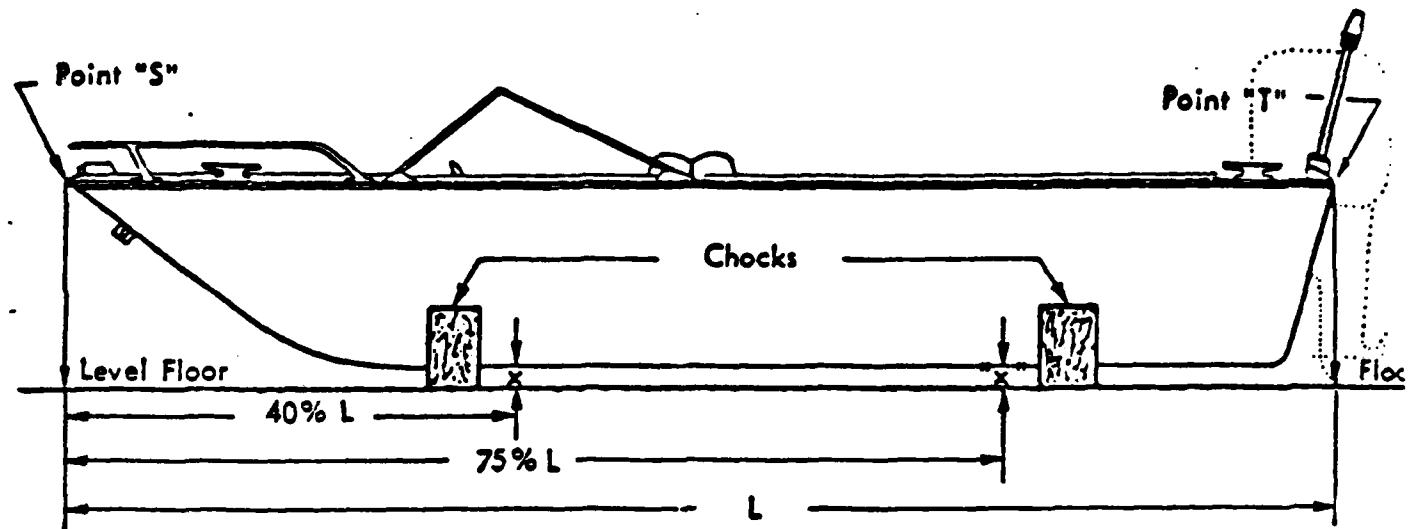


Figure 1. Locations of Points "S" and "T", and Determination of Boat Length (L)

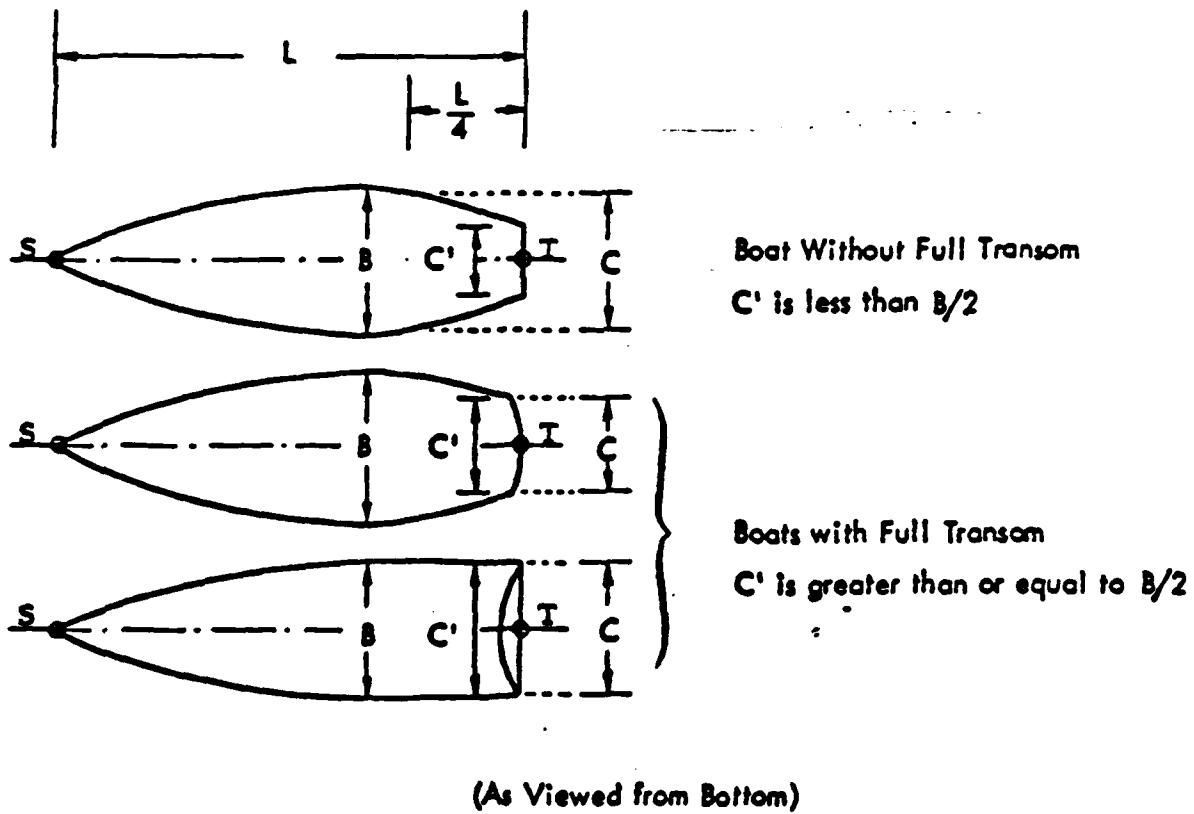


Figure 2. Determination of Transom Type

NOTE

Distance C shall not include handles and other similar fittings, attachments and extensions. Rubrails are included in C.

4.4.1.3 Transom Height - Using the measurement test set-up described in Section 4.4.1.1, measure the vertical distance, D_1 , between the floor and the lowest point along the upper boundary of the transom where provisions are made for the installation of an outboard engine(s). Measure the vertical distance, D_2 , between the floor and the bottom of the keel where the transom joins the keel. Record the difference, $D=D_1-D_2$, on Line 4 of Data Sheet No. 2. Check appropriate Nominal Transom Height block on Line 4 (a) of Data Sheet No. 2. (A nominal height of 20 inches shall mean that a deviation of 1 inch shall be allowed, i.e., the height must be at least 19 inches.)

4.4.1.4 Steering Mechanism - Observe location of steering mechanism and determine if mechanism is classed as a "Remote Steering Mechanism" as given in Section 3.0. If the steering mechanism is "remote", check "Yes" on Line 5 of Data Sheet No. 2; otherwise, check "No" on Line 5 of Data Sheet No. 2.

4.4.1.5 Hull Type - Hull type is determined by the following procedures:

- a. Visually inspect the hull in the regions where the hull bottom joins, or fairs into, the hull sides; and note the nature of the shape (throughout the length of the boat) used to join the bottom to the sides of the hull. If this intersection has a single discernible angle or "L" shape, with a radius of curvature less than .5", the boat is considered to be "Hard Chine". However, if the boat has a double or multi-chine as in the illustration, it will not be considered to be hard chine.



If the boat is not hard chine, check "Rounded/Soft Chine" on Line 6 of Data Sheet No. 2 and proceed to Paragraph 4.4.2.

- b. If the boat is hard chine, observe the deadrise at the midships station. If the deadrise appears to be clearly greater than 2.5° , check "Rounded/Soft Chine" on Line 6 of Data Sheet No. 2 and proceed to Paragraph 4.4.2. If the deadrise is questionable, measure it as specified below.

- (1) Using the vertical stands on either side of the boat at the midships station, stretch a string between them, tangent to the keel and equal distant from each chine.
- (2) At the point along the horizontal string 1 foot from the keel, measure the vertical distance from the string to the hull. Subtract the molded depth of any builtup keel protrusion from this distance.
- (3) Record the vertical distance on Line 6 of Data Sheet No. 2. If the distance is greater than or equal to one-half inch (0.5 inches), check "Rounded/Soft Chine". If the vertical distance is less than .5 inches, follow the procedure in Section (c).
 - c. Check for compound curvature in the bottom by laying a straightedge across the bottom at the amidships station from lowest chine to the edge of the keel. If the bottom has curvature, it will not be considered a flat-bottom boat. If the bottom is straight, it will be considered flat bottomed. Check the appropriate box on Line 6 of Data Sheet No. 2.

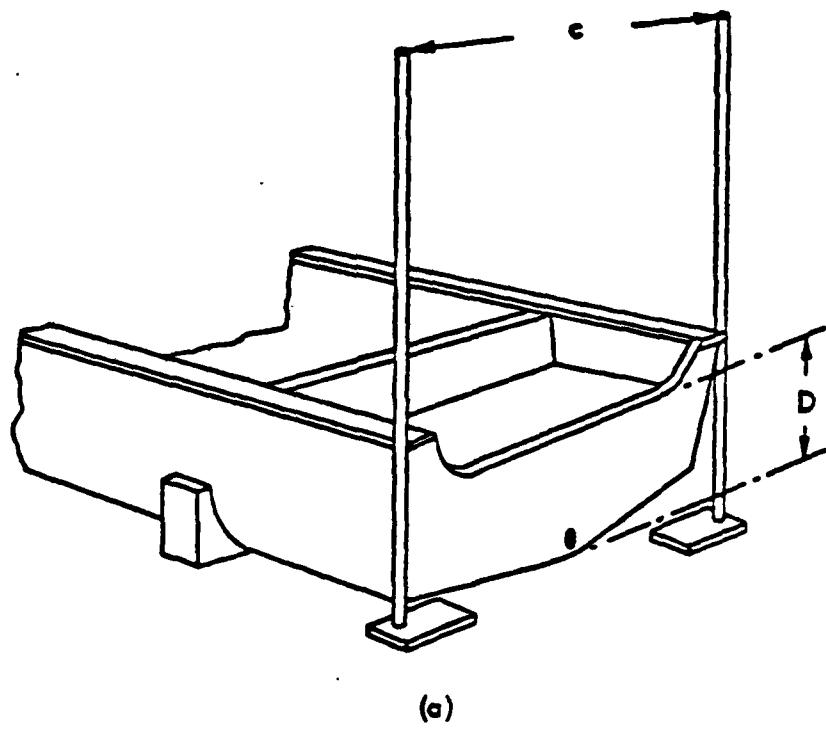
4.4.2 Maximum Allowable Horsepower (MAH) - Maximum Allowable Horsepower for an outboard boat is determined from a knowledge of the boat characteristics defined in Section 4.4.1, and by the use of the Outboard Boat Horsepower Capacity Table presented in Appendix A.

4.4.2.1 Determination of MAH for Outboard Motor Boats - The MAH for an outboard motor boat is determined by the use of Table 183.53 of Appendix A. Record this value on Line 7 of Data Sheet No. 2.

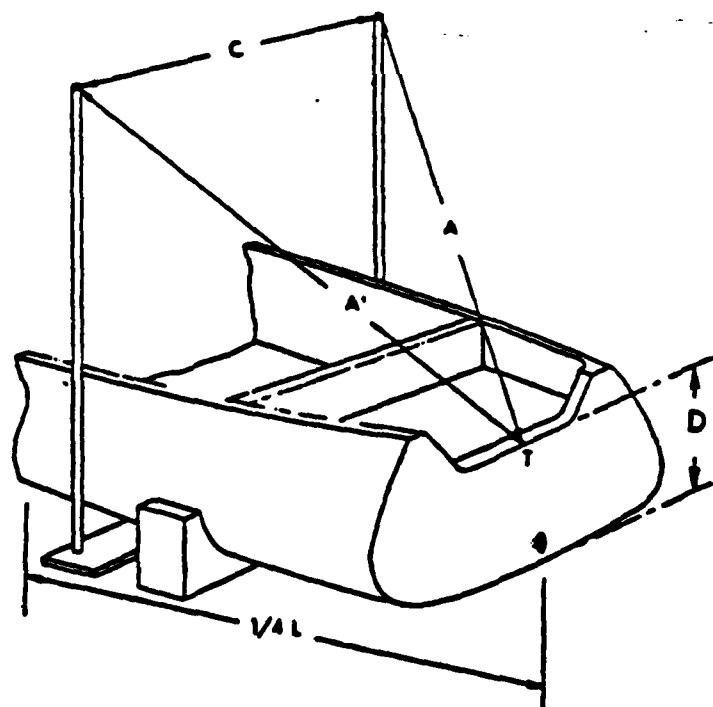
NOTE

33 CFR 183.53(c) can be misinterpreted to mean that values of 3 and $7\frac{1}{2}$ horsepower extracted from the upper portion of the table may be raised to the next multiple of 5, i.e., 5 and 10 horsepower respectively. The intent of the regulation is that only those horsepower values computed in the bottom portion of the table may be raised to the next multiple of 5.

4.4.3 Manufacturer's Horsepower Capacity - Determine the MAH shown on the manufacturer's display of capacity information, and record this horsepower on Line 8 of Data Sheet No. 2. (If the alternate capacity plate as defined in Appendix A is installed, record the appropriate value shown for the steering mechanism identified in Line 5 of Data Sheet No. 2.)



(a)



(b)

Figure 3. Determination of Transom Width (C) and Height (D)

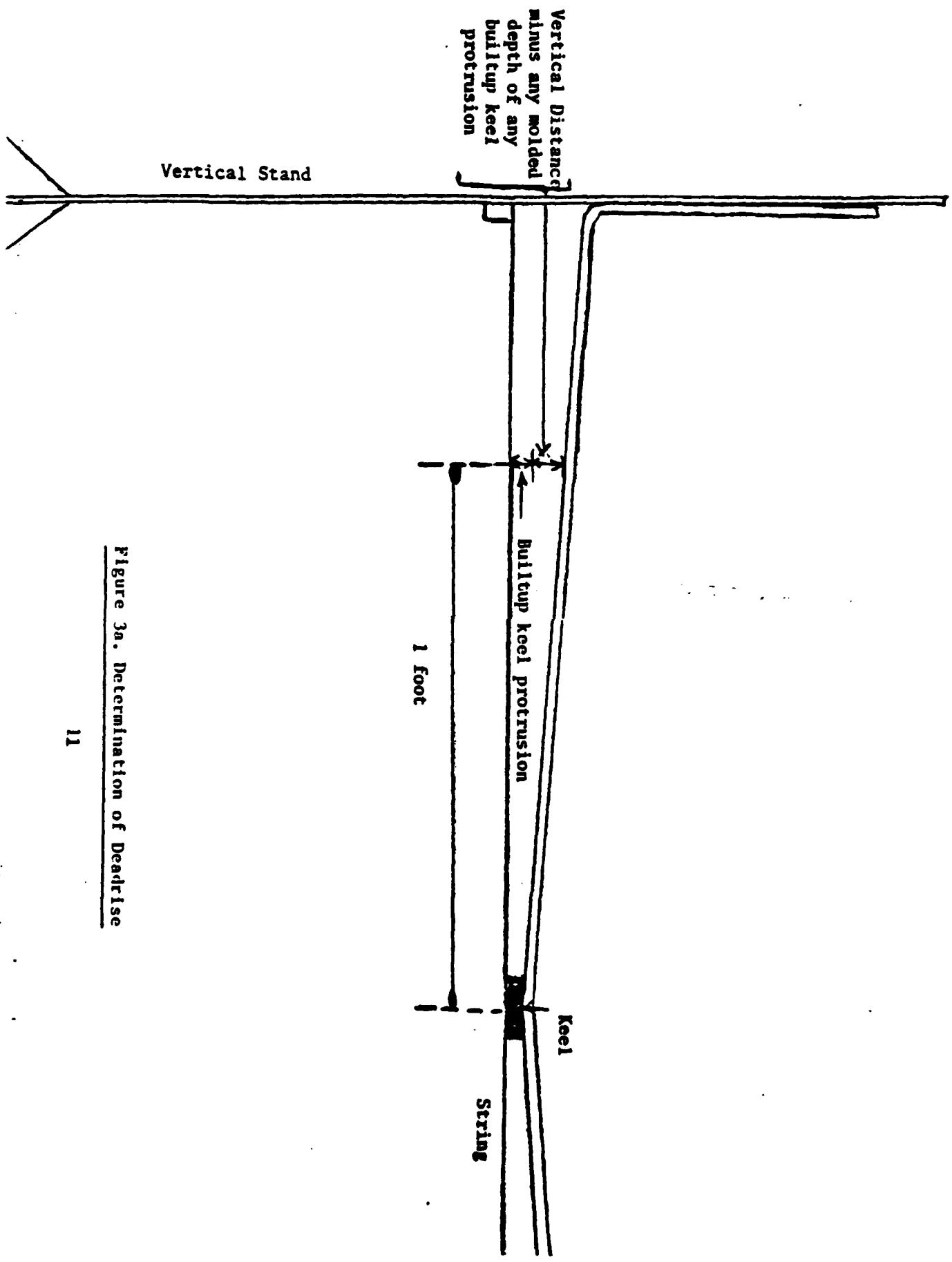


Figure 3a. Determination of Deadrise

4.4.4 Pass/Fail - If Item 8 of Data Sheet No. 2 is less than or equal to Item 7 of Data Sheet No. 2, the test specimen has passed the test procedure and "Pass" is entered on Line 9 of Data Sheet No. 2. If Item 8 is greater than Item 7, the test specimen has failed; this is recorded on Line 9 of Data Sheet No. 2 and Non-Conformance procedures as outlined in Section 5.1.1 are initiated.

4.4.5 Equipment - The following listed equipment will be needed to conduct this test:

Two (2) Vertical Bars (secured to stands)
Plumb Bob(s)
25 ft Steel Tape (accurate to within $\frac{1}{8}$ inch)
10 ft Steel Tape (accurate to within 1/8 inch)

5.0 TEST RECORDS AND REPORTS

5.1 Reporting

5.1.1 Notice of Non-Conformance - Any indication of a non-conformance shall be communicated immediately by telephone to the Coast Guard Contract Monitor or his designated representative and followed up in writing within three working days after detection of any of the anomalies. This notice shall be submitted in writing using the form shown on the following page, and should be accompanied by photographs, sketches and copies of such possible test data as required to convey the nature and extent of the non-conformance.

The Notice of Non-Conformance shall be signed by the responsible test engineer signifying that the information and, if applicable, pictures, etc., are explanatory of the circumstances present at the time the anomaly was detected. In addition, the department manager or other responsible test agency officer shall sign the notice to signify that the circumstances and description provided in the notice are correct and represent the non-conformance condition.

A signature block has been provided for a Coast Guard test witness. The provisions for this signature are not mandatory but have been provided to allow complete documentation of a non-conformance if the Coast Guard test witness (monitor) is present during the inspection and elects to direct disposition of the test specimen. For example, "note all circumstances and continue the inspection", or "discontinue the inspection of the applicable specimens and collect all data for Coast Guard review".

5.1.2 Compliance Test Data Sheet

5.1.2.1 Required Use - The Compliance Test Data Sheets (Data Sheets No. 1 and 2) included at the end of this section of the test procedure are mandatory for use in documenting the inspection and for test data observed or recorded during the performance of the test sequence outlined in this procedure.

NOTICE OF NON-CONFORMANCE

- Test Specimen Non-Conformance
- Test System or Other Out-of-Tolerance Condition

Job No.	_____
NC No.	_____
Contract No.	_____
Date	_____

To: _____

Attn: _____

Part Name _____ Serial No. _____

USCG No. _____ Specimen I.D. No. _____

Test _____

Test Procedure _____ Paragraph No. _____

Notification Made To: _____

Date _____ By _____ Via _____

Specification Requirements:

Description and Cause of Non-Conformance:

Specimen Disposition: _____

Comments - Recommendations:

USCG Test Witness: _____ Engineer: _____ (Signature)
Title: _____ Dept. Mgr: _____ (Signature)

5.1.2.2 Reproduction - The test data sheets have been designed to provide a standard means of identifying and reporting the test and inspection information required. The test data sheet can be readily reproduced on any type of dry copy machine when more than one sheet is required for recording test results of a series of like specimens or the repetitive test of any specific test specimen. All entries on these test data sheets shall be recorded in black ink or black type.

5.1.2.3 Standard Format - The test data sheets have been prepared to reflect the specific test data requirements outlined in this test procedure. The information on the forms has been standardized as much as possible, paralleling the degree to which the test procedures have been standardized. For example, all the compliance test procedures require test specimen identification and information resulting from the receiving inspection. These requirements can be described on the forms in a standard format. Conversely, the type of tests to be performed and the results to be recorded differ from one test to the other, thus, necessitating provisions for different data sheet formats for each test.

5.1.2.4 Submission - It shall be the responsibility of the test agency to submit the completed Compliance Test Data Sheets to the Coast Guard in the final report unless otherwise directed.

5.1.3 Formal Test Report - For each test, or series of tests, a formal test report shall be prepared and submitted to USCG for approval. Formal test reports shall contain the following major sections:

- a. Administrative data including Boating Safety Standard title and number, name of test laboratory, test laboratory report number or USCG task number, test article identification number, manufacturer's model number and serial number.
- b. Detail tabular and narrative results of each test including a complete presentation of any non-conformance, test anomalies, equipment problems, etc. The results shall explicitly state that the test article(s) did or did not meet the test requirements.
- c. Photographs of each test setup and any test article degradation that is detected.

All reports shall be signed by the report writer and shall have the notarized signature of a responsible test laboratory official.

DATA SHEET NO. 1
SAFE POWERING STANDARD TEST PROCEDURE
RECEIVING INSPECTION

1. Date: _____ Test Procedure No. _____
2. Specimen I. D. No. _____
3. Test Agency _____
4. Test Agency Job No. _____ Report No. _____
5. Nominal Length and Type of Boat _____ ft Inboard Outboard

 Other Stern Drive Other
6. Boat Mfg. Name _____
7. Boat Trade Name and/or Model No. _____
8. Engine Mfg. Name _____
9. Engine H.P. _____ Engine Model No. _____
10. Outdrive Mod. No. _____
11. Inventory of Other Accessories:

Qty	Description	Mfg.	Mod. No.

12. Description of Areas Which Might be Subject to Damage by Loading:

NOT APPLICABLE

13. Receiving Inspection Results:

Signature

Date

Test Conductor

Witness

Digitized by srujanika@gmail.com

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Approved

- 10 -

DATA SHEET NO. 2
SAFE POWERING COMPLIANCE TEST DATA
OUTBOARD BOATS

1. Test Article Identification No. _____ Test No. _____
(Optional)

2. Length: L = _____ ft \pm 0.04 ft (1/2 in.)

3. Transom Width: C = _____ ft \pm 0.02 ft (1/4 in.)

4. Transom Height Measured: D = _____ in. \pm 1/2 in.

(a) Nominal Transom Height: 20" 15"

5. Steering Mechanism — Remote Yes No

6. Hull Type: Flatbottom/
Hard Chine: Deadrise _____ Rounded/
Soft Chine _____

7. Maximum Allowable Horsepower: _____ HP

8. Manufacturer's Maximum Horsepower Capacity Marking: _____ HP

9. Pass/Fail: _____

Signatures

Date

Test Conductor:

Witness:

Approved:

TITLE 33--Navigation and Navigable Waters

CHAPTER I--COAST GUARD, DEPARTMENT OF TRANSPORTATION (CGD 73-250)

PART 183--BOATS AND ASSOCIATED EQUIPMENT

SUBPART D--Safe Powering

§183.51 Applicability

This subpart applies to monohull boats less than 20 feet in length, except sailboats, canoes, kayaks, and inflatable boats, that are designed or intended to use one or more outboard motors for propulsion.

§183.53 Horsepower capacity.

The maximum horsepower marked on a boat must not exceed the horsepower capacity determined as follows:

(a) Compute a factor by multiplying the boat length in feet by the maximum transom width in feet excluding handles, and other similar fittings, attachments, and extensions. If the boat does not have a full transom, the transom width is the broadest beam in the aftermost quarter length of the boat.

(b) Locate horsepower capacity corresponding to the factor in Table 183.53.

(c) If the horsepower capacity in Table 183.53 is not an even multiple of 5, it may be raised to the next even multiple of 5.

(d) For flat bottom hard chine boats with a factor of 52 or less, the horsepower capacity must be reduced by one horsepower capacity increment in Table 183.53.

Table 183.53--Outboard Boat Horsepower Capacity

COMPUTE: FACTOR = BOAT LENGTH X TRANSOM WIDTH

If factor (nearest integer) is	0-35	36-39	40-42	43-45	46-52 ..
Horsepower capacity is.....	3	5	7½	10	15

Note: For flat bottom hard chine boats, with factor of 52 or less, reduce one capacity increment (e.g. 5 to 3)

		No remote steering, or less than 20" transom	
If factor is over 52.5 and the boat has.....	Remote steering and at least 20" transom height	For flat bottom hard chine boats	For other boats
Horsepower capacity is (raise to nearest multiple of 5).....	(2XFactor)-90	(0.5XFactor)-15	(0.8XFactor)-25